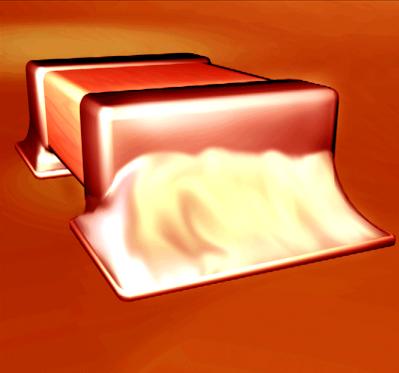


**SURFACE MOUNT TECHNOLOGY (SMT)  
CHIP COMPONENTS – RECTANGULAR / SQUARE END TERMINATIONS**

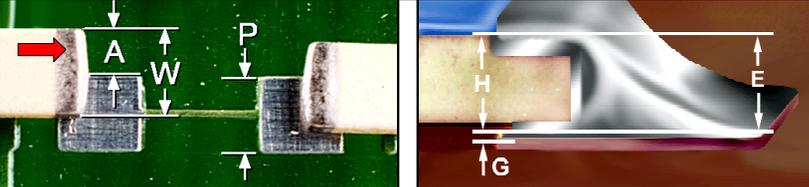


**CHIP COMPONENTS - RECTANGULAR / SQUARE END TERMINATIONS  
(1-3-5 SIDED)**

Rectangular and square-end chip components are characterized by their metallized termination cap design. Unlike their bottom-only termination cousins, the standard chip may be supplied with metallization on the end surfaces (1-sided); the bottom, end, and top surfaces (3-sided); or, the bottom, end, top, and sides of the termination cap (5-sided).

See Section 7.01 "Surface Mount Soldering, General Requirements", for common accept / reject criteria.

**SURFACE MOUNT TECHNOLOGY (SMT)  
CHIP COMPONENTS – RECTANGULAR / SQUARE END TERMINATIONS (cont.)**



**UNACCEPTABLE  
EXCESS LATERAL / SIDE OVERHANG (A)**

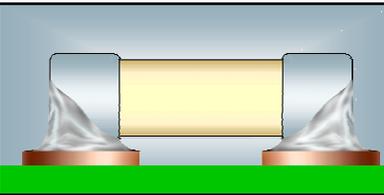
The component shall not hang over the edge of the termination land by more than 25% of the component termination area (W), or 25% of the land width (P), whichever is less.

[NASA-STD-8739.2 \[ 12.9.1.b.7 \]](#)

**PREFERRED  
MAXIMUM FILLET HEIGHT (E)**

The maximum fillet height shall be the solder thickness (G) plus the component termination height (H).

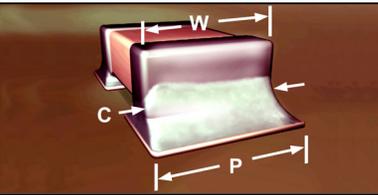
[NASA-STD-8739.2 \[ 12.9.1.a \]](#)



**PREFERRED**

Device is centered on the termination pads, with proper end overlap and no inside overhang. The solder termination exhibits a full concave fillet on the vertical terminal faces, with evidence of good wetting to the chip metallization and extends to the periphery of the land.

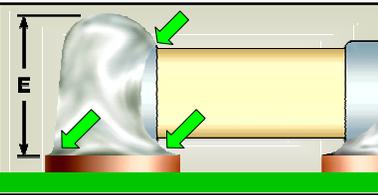
[NASA-STD-8739.2 \[ 8.7.4.g \], \[ 12.9.1.a \]](#)



**PREFERRED  
END JOINT WIDTH (C)**

The End Joint Width (C) shall be equal to or greater than the component width (W) or width of the land (P), whichever is less.

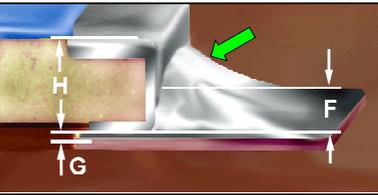
[Best Workmanship Practice](#)



**ACCEPTABLE  
MAXIMUM FILLET HEIGHT (E)**

The fillet may extend over the top of the end cap metallization, provided the fillet exhibits a positive wetting angle, and does not contact the component body.

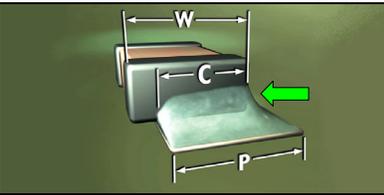
[NASA-STD-8739.2 \[ 12.9.1.a \]](#)



**ACCEPTABLE  
MINIMUM FILLET HEIGHT (F)**

The minimum fillet height shall be equal to or greater than the minimum solder thickness (G), plus 50% of the component termination height (H).

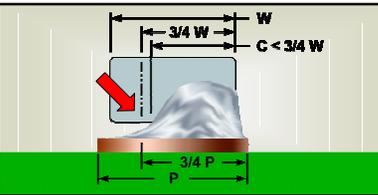
[NASA-STD-8739.2 \[ 12.9.1.b.3 \]](#)



**ACCEPTABLE  
END JOINT WIDTH (C)**

The End Joint Width (C) shall be 75% of the component width (W) or width of the land (P), whichever is less.

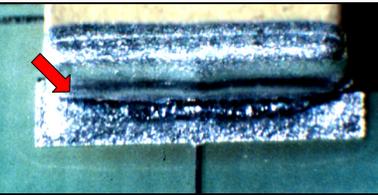
[Best Workmanship Practice](#)



**UNACCEPTABLE  
END JOINT WIDTH (C)**

The width of the end joint shall not be less than 75% of the component termination width (W), or 75% of the land width (P), whichever is less.

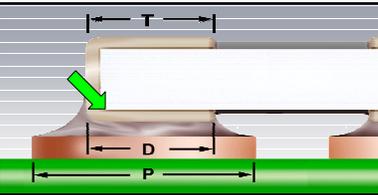
[Best Workmanship Practice](#)



**UNACCEPTABLE  
INSUFFICIENT FILLET HEIGHT (F)**

There shall be evidence of a properly wetted fillet between the chip and the land.

[NASA-STD-8739.2 \[ 12.9.1.b.3 \], \[ 12.9.1.b.5 \]](#)



**ACCEPTABLE  
SIDE JOINT LENGTH (D)**

The side joint length should be equal to the End Termination Length (T) and should extend to the periphery of the termination pad (P).

[Best Workmanship Practice](#)

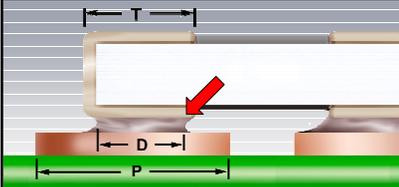
**NASA WORKMANSHIP STANDARDS**

	<b>NATIONAL AERONAUTICS AND SPACE ADMINISTRATION</b>  JOHNSON SPACE CENTER HOUSTON, TEXAS USA 77058	Released: 06.27.2002	Revision:	Revision Date:
		Book: 7	Section: 7.05	Page: 1

**NASA WORKMANSHIP STANDARDS**

	<b>NATIONAL AERONAUTICS AND SPACE ADMINISTRATION</b>  JOHNSON SPACE CENTER HOUSTON, TEXAS USA 77058	Released: 06.27.2002	Revision:	Revision Date:
		Book: 7	Section: 7.05	Page: 3

**SURFACE MOUNT TECHNOLOGY (SMT)**  
**CHIP COMPONENTS – RECTANGULAR / SQUARE END TERMINATIONS (cont.)**



**UNACCEPTABLE**  
**SIDE JOINT LENGTH (D)**

Although the solder fillet exhibits good wetting, the side joint length (D) is less than the End Termination Length (T), and does not extend to the periphery of the termination pad (P).

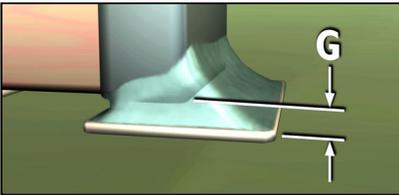
[Best Workmanship Practice](#)



**UNACCEPTABLE**  
**SIDE MOUNT**

The mounting of chip components on their side is prohibited.

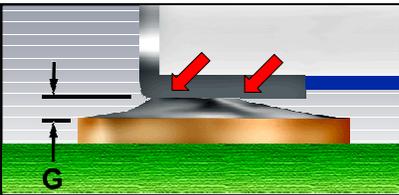
[NASA-STD-8739.2 \[ 12.8.2.a.2 \]](#)



**ACCEPTABLE**  
**SOLDER THICKNESS (G)**

The solder quantity shall be sufficient to form a properly wetted, concave fillet on the vertical surfaces of the chip, and which exhibits good wetting to the chip metallization and termination pad.

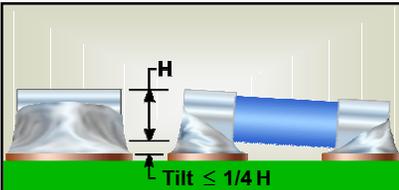
[NASA-STD-8739.2 \[ 12. 8.1.b \], \[ 12.9.1.a \]](#)



**UNACCEPTABLE**  
**INSUFFICIENT SOLDER THICKNESS (G)**

The solder quantity is insufficient to form a properly wetted, concave fillet which exhibits good wetting to the chip metallization and termination pad.

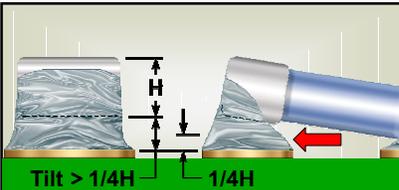
[NASA-STD-8739.2 \[ 12.9.1.b.5 \]](#)



**ACCEPTABLE**  
**TILT**

Part tilt shall not exceed 25% of the part thickness (H), and shall not interfere with the proper placement of adjacent parts.

[NASA-STD-8739.2 \[ 12.6.2.a.3 \]](#)

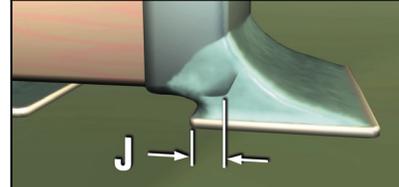


**UNACCEPTABLE**  
**EXCESS TILT**

Part tilt shall not exceed 25% of the component thickness (H), and shall not interfere with the proper placement of adjacent parts, or violate minimum electrical spacing requirements.

[NASA-STD-8739.2 \[12.9.1.b.1\], \[12.9.1.b.2\]](#)

**SURFACE MOUNT TECHNOLOGY (SMT)**  
**CHIP COMPONENTS – RECTANGULAR / SQUARE END TERMINATIONS (cont.)**



**ACCEPTABLE**  
**END OVERLAP (J)**

There shall be end overlap (J) between the component termination cap and the termination pad. Preferentially, the end overlap (J) should equal the termination cap length, with the component centered between the pads.

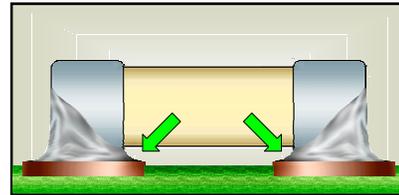
[Best Workmanship Practice](#)



**UNACCEPTABLE**  
**INSUFFICIENT END OVERLAP (J)**

There shall be end overlap (J) between the component termination cap and the termination pad to ensure the proper formation of the solder fillet.

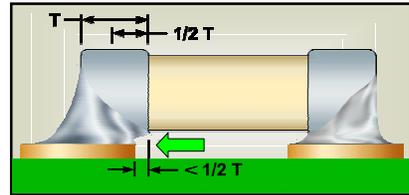
[Best Workmanship Practice](#)



**PREFERRED**  
**INSIDE OVERHANG**

The target condition is the component centered between the termination pads, without the inside edge(s) of the metallization pads overhanging the termination pad(s).

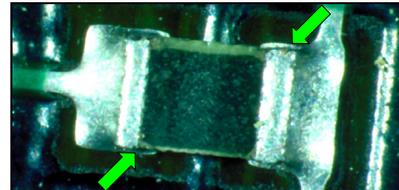
[NASA-STD-8739.2 \[ 8.7.4.g.2 \]](#)



**ACCEPTABLE**  
**INSIDE OVERHANG**

Inside overhang of the chip's metallization pad shall be less than or equal to 50% of the end termination width (t) and the minimum end joint width (C) requirements shall be met.

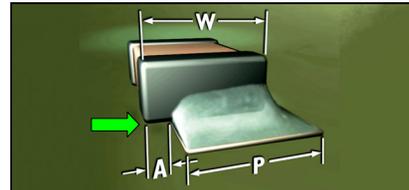
[NASA-STD-8739.2 \[ 8.7.4.g.2 \]](#)



**PREFERRED**  
**LATERAL / SIDE OVERHANG (A)**

The target condition is no lateral / side overhang, with the component centered on the land.

[NASA-STD-8739.2 \[ 8.7.4.g.1 \]](#)



**ACCEPTABLE**  
**LATERAL / SIDE OVERHANG (A)**

Lateral / side overhang (A) shall not exceed 25% of the component termination area (W) or land width (P), whichever is smaller.

[NASA-STD-8739.2 \[ 8.7.4.g.1 \]](#)

<b>NASA WORKMANSHIP STANDARDS</b>			
	NATIONAL AERONAUTICS AND SPACE ADMINISTRATION	Released: 06.27.2002	Revision: Revision Date:
	JOHNSON SPACE CENTER HOUSTON, TEXAS USA 77058	Book: 7	Section: 7.05 Page: 4

<b>NASA WORKMANSHIP STANDARDS</b>			
	NATIONAL AERONAUTICS AND SPACE ADMINISTRATION	Released: 06.27.2002	Revision: Revision Date:
	JOHNSON SPACE CENTER HOUSTON, TEXAS USA 77058	Book: 7	Section: 7.05 Page: 2

SURFACE MOUNT TECHNOLOGY (SMT) CHIP COMPONENTS – RECTANGULAR / SQUARE END TERMINATIONS (cont.)	
<p><b>UNACCEPTABLE END OVERHANG (B)</b></p> <p>End overhang is not permitted. <a href="#">Best Workmanship Practice</a></p>	<p><b>UNACCEPTABLE EXCESS INSIDE OVERLAP (X)</b></p> <p>Inside overlap (X) shall not exceed 50% of the End Termination Length (T). <a href="#">NASA-STD-8739.2 [ 12.9.1.b.8 ]</a></p>

NASA WORKMANSHIP STANDARDS			
	NATIONAL AERONAUTICS AND SPACE ADMINISTRATION	Released: 06.27.2002	Revision:
	JOHNSON SPACE CENTER HOUSTON, TEXAS USA 77058	Book: 7	Section: 7.05

**THIS PAGE IS  
INTENTIONALLY BLANK.**

<b>NASA WORKMANSHIP STANDARDS</b>			
 NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  JOHNSON SPACE CENTER HOUSTON, TEXAS USA 77058	Released: 06.27.2002	Revision:	Revision Date:
	Book: 7	Section: 7.05	Page: 6